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USER's MANUAL/INSTALLATION NOTE

Wind Sensor type WSS REC

- Mounting
- Connection
- Technical specifications
- References

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1. Introduction

This document provides guidelines for mounting and connecting the WSS REC static wind sensor.

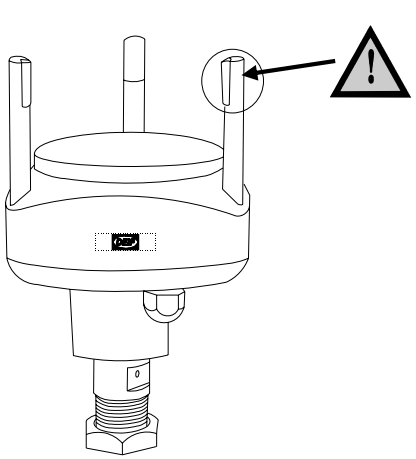
The ultrasonic wind measuring system used in the WSS REC is a fast responding and accurate system designed for measurement of wind speed and wind direction.

The sensor is based on three ultrasonic transducers arranged in a triangle for measuring of wind speed and wind direction. By measuring the time it takes for a set of ultrasound bursts to travel from each transducer to the other two, the wind speed and direction can be calculated.

The WSS REC has a built-in heater, which will automatically engage when risk of icing occurs during low temperatures.

Unpacking

The WSS REC sensor is delivered in a cardboard box. To protect the delicate sensor heads, it is important to store it in the box until mounting.



Do not hit, squeeze or try to remove the three black rubber hoods!

The sensor is protected against ESD (static electricity), but it is recommended to avoid static discharge through the connection wires during installation.

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the wind measuring system. If there is any doubt about how to install or operate the WSS REC, the company responsible for the installation or the operation of the product must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

2. Mounting the wind sensor

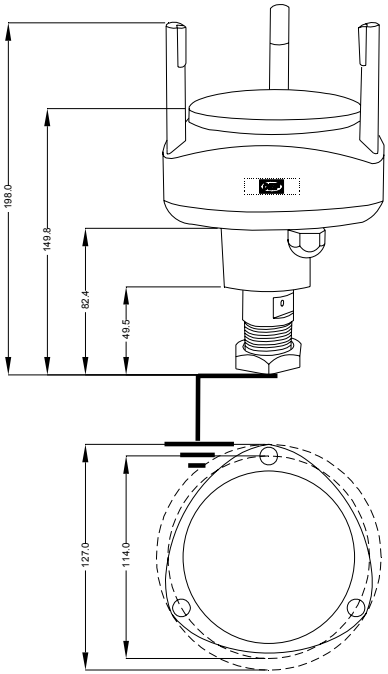
Placing of the wind sensor

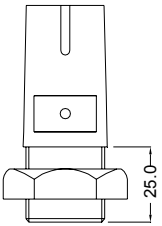
Ideally, the wind sensor should be placed far from large objects that might influence the measuring results; however, in practice this is normally not possible on a wind turbine. The best result is achieved by placing the wind sensor at the top of a mast in the opposite end of the rotor.

Placing the sensor just above the nacelle and just behind the rotor is disadvantageous. This may result in turbulence, velocities and wind directions that are out of proportion to the actual, undisturbed wind speed and wind direction.

The wind sensor is intended for installation on a vertical socket or a tube using the stainless steel tap mounting base. See the drawing on the next page for dimensions of the tap. **The tap must not be removed from the wind sensor, as this will damage the waterproof sealing and the warranty will become void.**

Do not expose the plastic part of the wind sensor to any torque when mounting the sensor. The tools used for fastening are only to be applied on the actual tap.

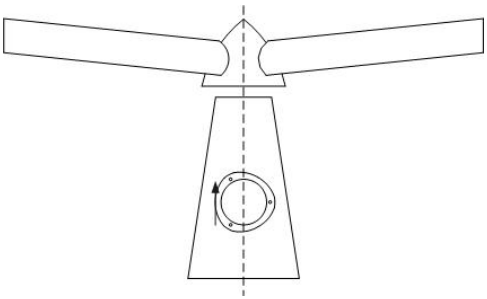




¾" pipe thread:
Outer diameter: 1.04inch (26.4mm),
14 threads per inch

IMPORTANT!
The stainless steel mounting base on the WSS sensor must be connected to earth (e.g. the steel hull).

To ensure that the measurement represents the precise wind direction relative to the turbine, the wind sensor must be aligned correctly. I.e. when mounting the wind sensor, the arrow printed on the bottom of the sensor must be parallel with the centre axis of the nacelle from rotor to the back.
On land-based, non-rotating installations, the arrow must point towards North.



Bird avoidance kit (optional)

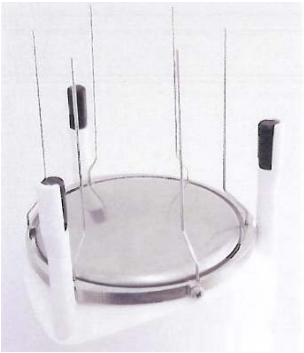
The bird avoidance kit is designed to reduce the risk of birds landing on the WSS REC and thereby interfering with measurements or even damaging the sensitive ultrasonic transducer heads (the black rubber heads may attract the attention of birds). The kit is an optional extra and is installed on top of the sensor.

The spike system is designed not to hurt birds, but simply create a barrier to make it difficult for birds to land on top of the sensor. Please note that the kit does not provide complete protection against birds, but especially large sea birds will not be able to land, whereas small birds may still be able to squeeze in. Small birds may interrupt the wind measurement, but will not be able to damage the sensor. The shape and location of the spikes is designed so the interference with wind measurements is negligible. It is recommended to use the kit if there is a high accumulation of birds in the area where the sensor is used.

When the kit is mounted on the WSS REC sensor, more snow may be able to accumulate on top of the sensor, and it may melt slower.

Installation of the kit

1. Position the metal ring with spikes around the stainless steel top plate of the WSS REC sensor. Position it so the spikes do not block the direct paths between the three black rubber heads, see picture.
2. Secure the metal ring using the M3x6 screw provided. It is recommended to secure the screw from loosening due to vibrations with a drop of Loctite® super glue or equivalent (not included in the kit) and tighten the screw all the way in.
3. Check that the kit is fitted tightly on the WSS REC.



3. Cable connections

The wind sensor is supplied with 10 metres fixed cable. From factory, the cable is connected to the sensor via a waterproof gland, and this must not be replaced by another cable. The cable can be extended by using the connection box kit or the IP67 connector kit (both optional).

In order to protect the wind sensor and the personnel in the best possible way from lightning strokes, use a lightning rod installed with the tip at least one metre above the wind sensor. The lightning rod must be properly grounded in compliance with all applicable safety regulations. The wind sensor cable screen and the extension cable screen must be connected.

For further protection of the cable from the wind sensor, it is recommended to use a metal conduit pipe cable.

Suitable extension cable is available from DEIF at any length between one and 300 metres. Alternatively, an installation cable, e.g. UL2464 18AWG4C + AE, 4 x 0.75mm^2 screened, can be used. The max. length is 300m, and maximum 70nF capacity between the signal conductors.

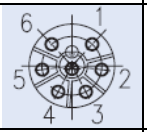
The WSS REC wind sensor cable connections

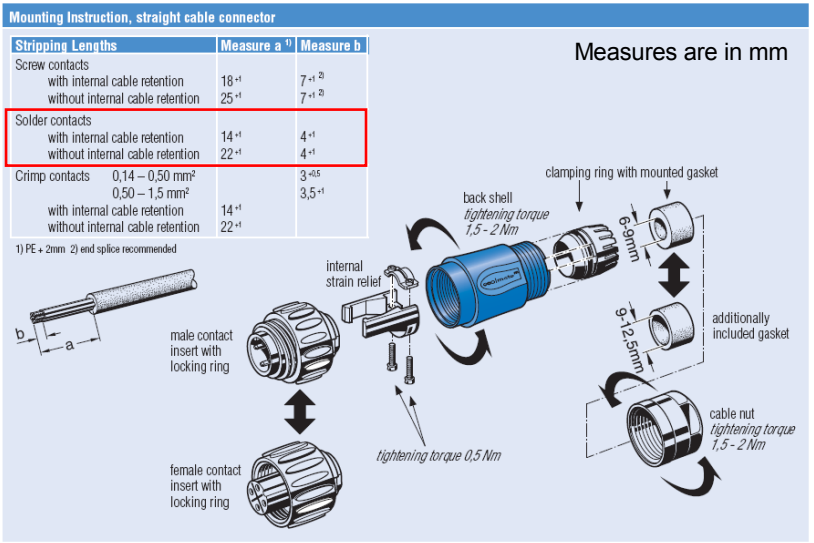
Cable colour	Function		Note
Black	Supply voltage	-	9-31V DC supply for the WSS REC wind sensor
Red		+	
Orange	RS485 comm.	A	Wind speed and direction data output
Brown		B	
Shield	Cable shield		Is connected to the stainless steel tap inside the WSS REC

No supply voltage must be present during installation of the wind sensor, as this will damage the wind sensor.

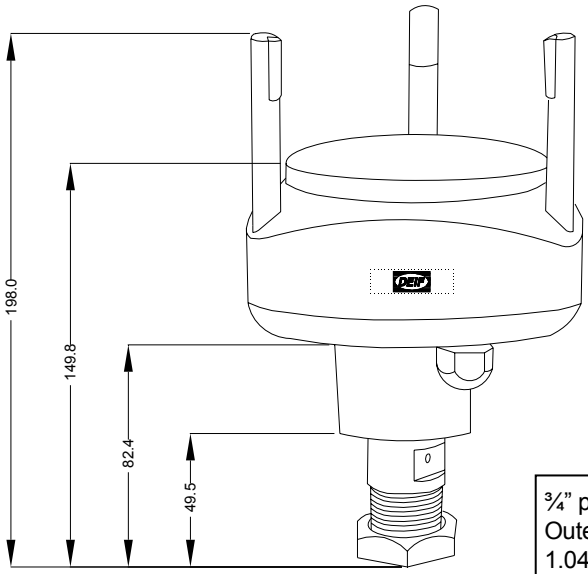
Connector kit assembly (optional)

The connectors must be soldered onto the cable according to the following instructions:

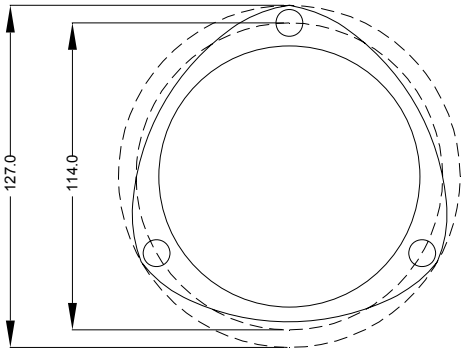
WSS fixed cable **Male connector**	**Connector pin no.**	**WSS extension cable** **Female connector**	**Signal comments**
Plug male 7 pin. 10 22 00 00 52		Plug female 7 pin. 10 22 00 00 53	
Screw cap male, 10 29 92 00 02		Screw cap female, 10 29 92 00 03	
Black (-) ●	1	Black (-) ●	30V DC supply for WSS REC
Red (+) ●	2	Red (+) ●	
Orange ●	3	Orange ●	RS485 comm. from WSS REC
Brown ●	4	Brown ●	
Screen ●	5	Screen ●	Cable screen



4. Dimensions



¾" pipe thread:
Outer diameter:
1.04inch (26.4mm),
14 threads per inch



5. Technical specification

Sensors are designed according to the standards below		Standards
Power supply	12/24V (9.0…31.2V DC)	
Power consumption	WSS REC with inactive heating element: <0.1W WSS REC with maximum heating: ≤15W	
Interface	RS485 bus: The bus should be terminated with 120 to 200 ohm for pure RS485 operation RS422 bus: For single listener connection on RS422, the data line must be terminated with a 200 to 250 ohm resistor to obtain the necessary output	
Data sentence	$WIMWV – Wind speed and direction data $WIXDR – Transducer measurement response $WITXT – Error messaging For details, see doc. no. 4189350038, Appendix to User's Manual, WSS REC	NMEA 0183 ver. 3.0
Wind speed	Range: 0….60m/s Resolution: 0.1m/s Accuracy: 0…35m/s: ±0.3m/s or ±3%, whichever is greater >36m/s: ±5%	
Wind direction	Range: 0…. 360° continuously Resolution: 1° Accuracy: ±3% in relation to wind direction	
Update interval	1 sec.	
Start-up time	<5 sec. from power on to valid data output	

Sensors are designed according to the standards below		Standards
Connection	10 metres 4 x 0.75mm^2 screened cable type UL2464 18AWG/4C+DW+AL/MY+Jacket The 10m cable is fixed on the sensor and is open-ended	
Mounting	¾" pipe thread: Outer diameter: 1.04inch (26.4mm), 14 threads per inch	
Protection	IP66	IEC 529 and EN 60529
Relative humidity	0…100%	EN/IEC 60068-1/2
Pressure	600…1100hPa	
Temperature	WSS REC operating range: -52…+60°C (class approved for: -25…+60°C) Storage (both): -60…+70°C	EN 60051
Vibration test	3…13.2Hz: 2mm (peak-peak) 13.2…100Hz: 0.7g	EN 60945, EN/IEC60068-2-6 and DNV Class A
	3…15Hz: ± 2.5mm (peak) 15…50Hz: 2.3g	GL curve 4 for masts
Safety	Cat. III, poll. dg. 2, 550V AC rms, 50Hz, 1 minute	EN 61010-1
EMC	CE-marked for industrial environment	EN 61000-1-1/2/3/4
Housing	Wind sensor housing: Polycarbonate +10% glass fibre Mounting tap: Corrosion-resistant stainless steel	UL94 V0
Weight	0.8kg	
Dimensions, cardboard box	450 x 315 x 230mm	

Sensors are designed according to the standards below		Standards
Accessories	IP66 connection box kit: IP66 connection box with cable glands and screw terminals to extend the sensor cable with an extension cable IP67 connector kit: Watertight male and female connector for soldering to the sensor cable and the extension cable respectively Extension cable: 1 to 300m shielded cable, DEIF ID no.1020230016 Bird avoidance kit: Spike kit to prevent birds from interrupting the wind measurements or, in worst case, from damaging the sensor	

6. References

For more details, please refer to the following documentation:

Appendix to User's Manual, WSS REC, document no. 4189350038.

Documentation is available at www.deif.com – Download centre.

DEIF A/S reserves the right to change any of the above.